A Toolkit to Assist L2 Learners Become Independent Writers

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Abstract

This paper describes a resource-rich toolkit that assists EFL writers take a discovery-based approach to writing accurate and fluent English. The system helps learners identify lexico-grammatical errors by matching patterns gleaned from a very large corpus of learners' texts. Users are guided to appropriate language patterns as they write and revise through online declarative and procedural resources. Even as more robust and fully automatic feedback technologies evolve, comprehensive resource-rich support will remain necessary for second-language (L2) writers who must develop practical life-long language learning strategies. To assist language tutors support novice L2 writers, we have also produced tools that help tutors reinforce their students' independent writing and proofreading strategies. The operation and rationale of this approach have been implemented and evaluated in several Hong Kong universities and secondary schools.

1 Introduction

Proofing technologies for L2 writers have been of interest to the NLP community since the 1970s, and have been subject to critical evaluation since the early 80s (e.g., Frase et al, 1981, Dobrin, 1985). In spite of continued interest in this area (e.g. Vernon, 2000; Foster and Vogel, 2004; Yi et al, 2008; Bender, 2009), computational linguists themselves remain disappointed with the lack of ongoing development of commercially available systems (Wampler, 2002). A more serious problem, from the view of applied linguists, is that en-

thusiasm for the technology has often resulted in a purely operational approach. The focus on algorithmic solutions to the correction of ill-formed input has frequently overlooked the long-term pedagogical needs of L2 novice writers. The parsing techniques of grammar checkers may reliably flag a subset of L2 errors; however, there is some question as to whether automatically generated prescriptive advice, even when it is reliable, actually helps learner language evolve (Bolt, 1992; Chen, 1997). While machine-generated error identification and correction may be a desirable convenience for casual writers, explicit correction by a machine, or for that matter, a human tutor, appears to be counterproductive in the development of an L2 writer's proficiency (Truscott, 1996; Ferris and Hedgcock, 2005).

The goal of the project described here is to develop a suite of tools that will help novice writers who are learning to write in academic or professional contexts improve the accuracy and fluency of their texts, while also becoming more confident in their long-term command of English. We have developed companion tools to help teachers of writing improve the efficiency and reliability of their feedback, and move L2 novice writers toward life-long independence. The following section outlines some of the limitations of currently available grammar checking software in accomplishing these goals.

2 Limitations of Parsing Technology

Most grammar checking programs use some form of parsing to identify errors. Typically, if a sentence is ungrammatical according to a set of parsing rules, the programs attempt alternate analysis. However, the unconstrained text of L2 learners is

difficult to parse. Even more demanding is the ability of software (or, very often, human tutors) to suggest a 'correct' version that reflects the writer's intention. This requires semantic disambiguation well beyond our current ontology or technology.

The difficulties in parsing natural language are compounded in the case of interlanguage (Schneider and McCoy, 1998). Parsers generally are based on theoretical models of how grammatical sentences of the target language should be constructed. This approach is especially ineffective for cases where the speakers' first language is linguistically remote from the target language. For example, the current version of the parser-based grammar checker in Microsoft Word sacrifices a low rate of recall for a relatively high rate of precision in the analysis of Chinese speakers' English texts. That is, it displays few flagged errors compared to the total number of errors actually occurring in a text, a necessary trade-off resulting from the need to reduce distracting false positives. This is understandable since the rates of recall and precision for various grammatical constituents are inconsistent, and the numbers of false positives are not easily reduced across all types of grammatical constructions.

The insufficient, but nevertheless often still inaccurate, and frequently non-existent, advice of these programs is easily demonstrated. Following are a few common sentence-level errors produced by Chinese-speaking novice writers, and the comments generated by the Microsoft Word grammar checker:

1. *It worth studying hard.*
[Advice: Fragment (consider revising**)**]
2. *I born in Hong Kong.*
[Advice: substitute *I bore / I had born / I have born*]
3. *There have three students there.*
[Error not flagged]

These errors are typical examples of learners' attempts to map Chinese syntax on English constructions (treating 'worth', which functions here as a preposition[1], as a verb, forcing the passive verb 'born' into an active construction, and blending the verbs 'be' and 'have' into one form, as their equivalents are in Chinese). The first comment is unhelpful; all options in the second set of suggestions are, bizarrely, further from Standard English than the student's original text, and the third sentence passes without comment.

In addition to its general unreliability for L2 writers, grammar/style-checking software has been censured for giving overly narrow and prescriptive advice (Pennington, 1992), for compounding the already constrained nature of L2 production (Chapelle, 2001) and for otherwise abusing the tenets of good pedagogy (McGee and Ericsson, 2002). Even if the reliability of parsing technology can be significantly enhanced, much of the composition research of the last fifty years has argued against imposing corrections on the texts of novice writers. Current theories of language pedagogy promote learner independence and discourage direct correction by tutors. In light of the limitations of writing software, reliance on a deus ex machina for correction is hardly a desirable alternative to dependence on a language tutor.

A more principled, and ultimately more valid, role for language tools in supporting L2 novice writers is to enable them to test their evolving hypotheses of the L2. This should free the human tutor in an academic context to act as a guide, ensuring that these hypotheses evolve.

3 Assisting L2 Writers become Independent

Our objective has been to develop a program that avoids machine-generated prescription, while still helping L2 writers identify common grammatical, lexical and style errors. Instead of proscribing usage and preempting users' choices, we expose L2 writers to authentic language and help them become aware of the differences between their interlanguage and the particular L2 genre they are attempting to produce.

Unlike typical grammar checkers, our program does not appropriate the embryonic text of novice writers. Many of these learners will spend much of their professional life writing in the L2, and they need to develop independence. While not explicitly correcting lexico-grammatical errors, we aim to sensitize learners to common errors, without relying on a generic parser.

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[1] The tendency of most dictionaries to label '*worth*' as an adjective, regardless of its function in the sentence, may compound the confusion for speakers of Chinese, who often confuse adjective and noun forms and functions.
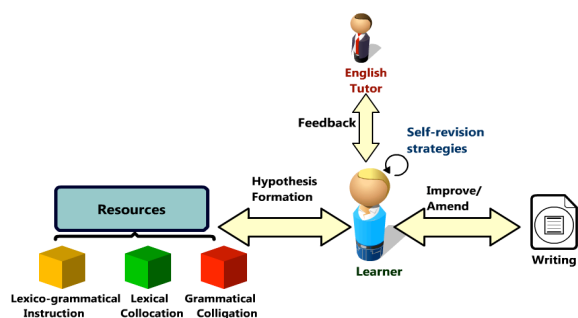
Figure 1: A discovery-based model of the writing process.

Figure 1 illustrates our model of a discovery-based approach for L2 writers. During the writing process, learners can consult resources that provide information on problematic L2 grammatical structures, as well as the semantic and collocational properties of L2 lexis. Users are guided through a discovery process that helps them become responsible for their own writing, thus reducing the burden on both software and human tutors to identify and correct errors. The role of the software, and of the human tutor, is to assist the writer express meaning in an acceptable manner, rather than explicitly to interpret the writer's text.

Our approach allows L2 writers to improve in two fundamentally different ways: through didactic explanations and via an inductive/procedural approach. They can choose either method or a combination, depending on the nature of the language problem and each user's learning style (e.g., their extent of 'field dependence', see Witkin et al., 1977).

The program 'Check My Words' (Figure 2) gives L2 novice writers access to interactive explanations of common structural and lexical errors from an Internet grammar as they write. These explanations are based on an analysis of a large L2 corpus consisting of millions of words of the writing of Chinese speakers, from which a typology of misused, and blatantly underused or overused lexical and structural patterns, was extracted (e.g., Milton, 2001). Hundreds of problematic words and patterns in a learner's text are explained. This is the kind of didactic, deductive advice that a good textbook might provide, except that there are few textbooks targeted directly at the EFL learning difficulties of speakers of particular L1s, and this internet grammar is embellished with interactive multimedia: it is fun to use.

Secondly, the program enables learners to discover how the language they are struggling to use is formulated in relevant, professionally written texts. They have a choice of search engines that they can use to look up words in context. Together, these search engines address many of the problems learners encounter in choosing words, forms and constructions. This inductive, procedural access to writing models, combined with the feedback tutors can provide via companion tools, greatly increases the amount of positive and negative evidence about the L2 available to the novice writer—support that researchers of applied linguistics believe promotes language acquisition (e.g., Trahey and White, 1993, Doughty and Varela, 1998).

In addition to helping learners become more confident, responsible, and independent in selecting language that is both accurate and appropriate to their purposes, this approach helps relieve language tutors of the need to act as proofreading slaves. When learners are given the tools to attend to form, taught how to use the tools, and held accountable for their own progress, teachers can share more of the burden of responsibility for learning with their students. This approach reduces the need to impose corrections, either by human or machine intervention. The next section explains this procedure in more detail.

4 Promoting language awareness

'Check My Words' is designed to encourage learners of English become aware of the role of lexis, forms, and functions in the L2, and to self-correct. Errors in the L2 writing of Chinese speakers have been analyzed and compiled into an online grammar guide mapped to the user's word processor so that problematic words and structures can be queried during the writing process to determine if they are misused in the writer's document.

An example is one of the interlanguage patterns we noted earlier: 'It worth studying hard.' In such cases, where the error is easily captured as a lexical pattern ('worth' occurring without the verb 'be'), the program highlights the pattern, and the user then presses a 'Check' button to see possible errors, with the most probable error highlighted (Figure 3). The user selects a link to consult the English Grammar Guide (EGG).

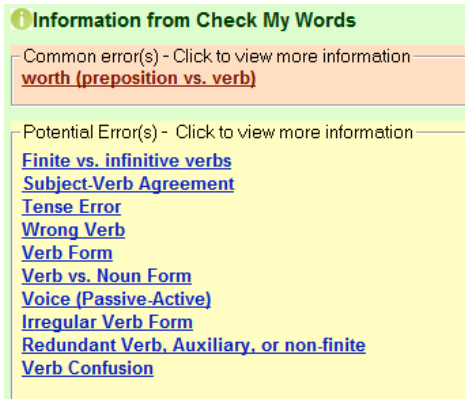Figure 2: The *Check My Words* toolbar for EFL learners.

Figure 3: The type of prompt that appears when a learner 'checks' a highlighted expression.

Explanations in the EGG are accompanied by examples and a mini-test. Interesting multimedia resources are also used to illustrate the explanation. For example, in Figure 4, the use of the word 'worth' is exemplified in an advertisement that sells its products with the rationalization that 'you're worth it'.

Figure 4: An explanatory fragment of the word 'worth' from the English Grammar Guide.

Over 500 lexico-grammatical errors are indexed, based on a comprehensive analysis of a corpus of the learners' texts. Figure 5 illustrates a cartoon conversation addressing another common error in this interlanguage—the blending of the verb and adjective functions of 'concern' (e.g., 'I concern about…').
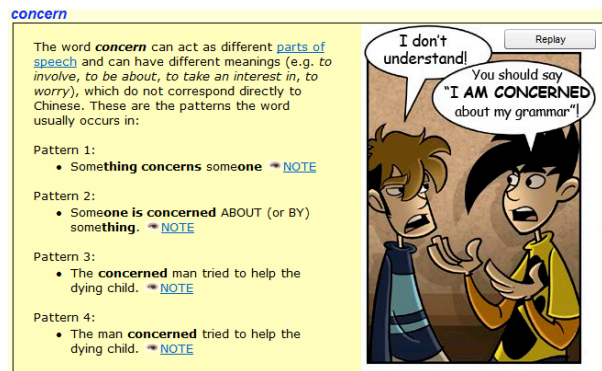
Figure 5: An explanatory fragment of the word 'concern' from the *English Grammar Guide*.

In addition to an online descriptive grammar, the program points users to procedural/inductive resources—online lookup engines—where they can explore the contextual properties of difficult L2 patterns and retrieve collocates of any word or pattern.
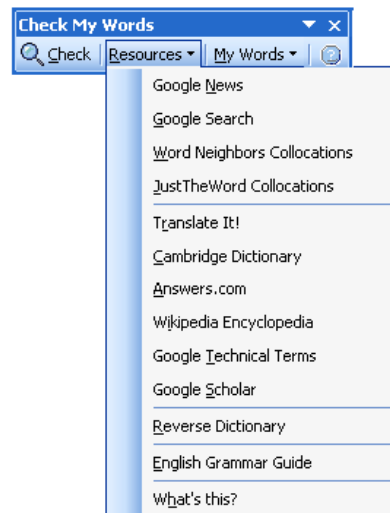

Figure 6: The pull-down list of resources on the *Check My Words* toolbar.

Users choose one of these resources from the Check My Words toolbar (Figure 6), and the program generates appropriate search syntax for each lookup resource (a Google search of the web, news or scholarly articles, or via our own lookup engine, 'Word Neighbors'). These resources provide

'snapshots' of the word or structure in context, which is especially useful for learners who have not read widely in the L2. Word Neighbors displays the collocational properties of words and phrases in selected, professionally written texts, and provides learners the opportunity to explore the relationship between their own output and L2 target forms. Users are guided in looking up words and expressions in Word Neighbors via the dialogue shown in Figure 7.
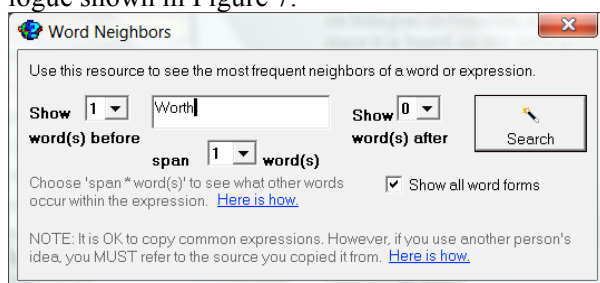

Figure 7: The dialogue prompt for *Word Neighbors*.

The features of Word Neighbors' can be demonstrated by again exploring the sample error: It worth studying hard. Figure 8 displays the word worth as the target word. The search parameters are set by default to display missing words and to suggest alternatives for malformed words. Word Neighbors also displays patterns as they occur in various genres. The parameters Show X words before/after allow users to select the number of words to be shown before or after the target word. The Span X word(s) drop-down enables the user to investigate possible missing or redundant words in a phrase, and the Show all word forms checkbox enables users to display all forms of a word.

The first screen from the Word Neighbors search result (Figure 8) shows all classes2 of the target word and, in this case, the classes that normally precede that word. The user has empirical evidence that worth is usually a preposition preceded by a copula verb. Clicking Show results displays specific instances of this pattern (Figure 9). Clicking See contexts then displays sentences and paragraphs containing the words (Figure 10).

The difference between our approach to error correction and that of systems that rely on automatic detection is well illustrated by preposition errors. Chodorow et al (2007), for example, discuss a method for detecting preposition errors that they report achieves a precision of 0.8 and a recall of 0.3.

Figure 8: *Word Neighbors* displays search result of the word '*worth*' in different word class patterns

Figure 9: *Word Neighbors* displays the search result for the pattern VERB + PREP.

Figure 10: *Word Neighbors* displays sentences containing the pattern *'is worth'*.

While this type of ambitious scientific research is important and interesting, it is still of limited use by non-native writers. We have not attempted to flag preposition errors unless they are invariable associated with a frequently misused lexical pattern (e.g., 'They demanded for more time.'). Instead, the novice writer is encouraged to use a resource such as Word Neighbors to look up the typical patterns of prepositions. These errors lend themselves well to such a pattern-matching approach. If we take this error as an example, the user has only to highlight the words surrounding the preposition, and look up the pattern 'demanded * more'. The program ellipts the preposition and looks for a span of three words, resulting in the display in Figure 11.

Concordance-type tools such as Word Neighbors provide authentic information about the patterns of language, but the L2 writer must often decide which context is appropriate for a particular case. Dialogue boxes and tutorials give learners guidance with this discovery-based learning approach. Supporting pedagogical materials that teachers using these tools have developed allow learners to practice correcting sentence level errors. The materials are aimed particularly at increasing the learners' awareness of collocational restrictions and at encouraging them to look up collocational properties. The materials have been integrated into EFL courses at several Hong Kong universities and secondary schools.
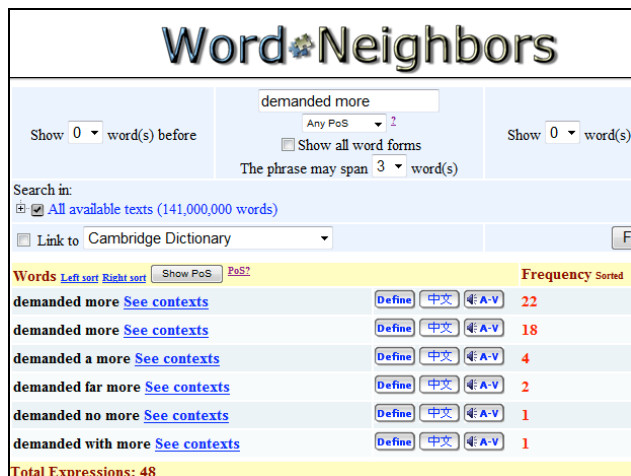

Figure 11: *Word Neighbors* displays the patterns of '*demanded * more*'.

We have found that in institutional contexts where novice writers may have learned to rely completely on teacher feedback for correction, simply putting tools in students' hands is not enough. In the next section, we describe companion tools that enable teachers to prompt their students to notice particular errors and reformulate their sentences without the teacher's explicit correction.

5 Resource-rich Feedback

Teachers of academic written English face enormous problems when they, rather than the learners themselves, bear the burden for improving the accuracy and fluency of their students' texts. Teachers are typically called upon to provide individual support to large numbers of students who are often at various levels of acquisition and who have a wide range of motivational drives and individual needs. These quantitative demands, together with the complexity of understanding and reformulating the texts of novice writers, limit the effectiveness of any feedback a teacher can provide. In addition, teachers often find themselves repeatedly identifying and correcting errors that they have pointed out many times before. This is especially discouraging when the errors reoccur in the same student's texts.

This was the impetus for the design of Mark My Words, a companion to the students' version, Check My Words. Like Check My Words, it installs as a toolbar in Microsoft Word (Figure 12). Teachers can use this tool to insert 'resource rich' comments in students' texts (e.g., Milton, 2006). These comments include links to the resources available from the students' Check My Words toolbar. Students can be held accountable for reformulating their own texts using the same resources they themselves have available during the writing process.

The following steps illustrate the process a teacher might use when responding to a student's text. This procedure is ideally employed after the student has completed at least one draft and followed a revision process similar to that outlined in the previous section. Let's assume that a student has submitted a text containing the error illustrated previously ('It worth studying.').

Teachers have a variety of options in commenting on a text, depending on how explicit they want to be. When the teacher wants to bring an error to

Figure 12: The *Mark My Words* toolbar for tutors of English.

the student's attention, the teacher puts the cursor on the word or highlights a phrase and clicks a Mark button. The program attempts to identify the error based on simple heuristics (e.g., identifying the POS and any pattern that matches a mal-rule), and dialogues such as the following one presented in figure 13 are available.

The 'Topic' and 'Hint' text boxes contain boilerplate comments that the teacher customizes as desired. The teacher can accept the default suggestions or select a resource or search engine and set parameters to display the Standard English lexical pattern. The English Grammar Guide link, online dictionary, and Word Neighbors are selected in this example. These links then appear in the student's text. These links reinforce the student's familiarity with the resources, encouraging students to use the resources to revise their texts.

The student has only to 'mouse over' the teacher's initials to see each 'resource rich' comment, and can click to open the resource. In the example illustrated in Figure 14, three resources are available: usage explanations (the 'Click here for more advice and practice' link points to the relevant page of the online English Grammar Guide), definitions (Cambridge Dictionary), and collocational patterns (Word Neighbors).

Teachers can comment on repeated errors of the same type by clicking a 'Copy Comment' button, although usually it is not necessary (nor advisable) to highlight every error. Current feedback pedagogy suggests that, rather than highlighting all errors, it is more effective to draw students' attention to a subset of errors. In addition to comments covering the most distracting and disruptive types of sentence level errors, the Mark My Words program lists many other comments covering formatting, organization, style, content, and logic. Teachers can easily add more comments, and customize and associate these with any concept or pattern in a student's text, and these in turn with any online resources. By having students concentrate on structures and lexis that are particularly difficult for each individual, we can more reasonably expect L2 novice writers to learn to identify and revise these problems themselves.
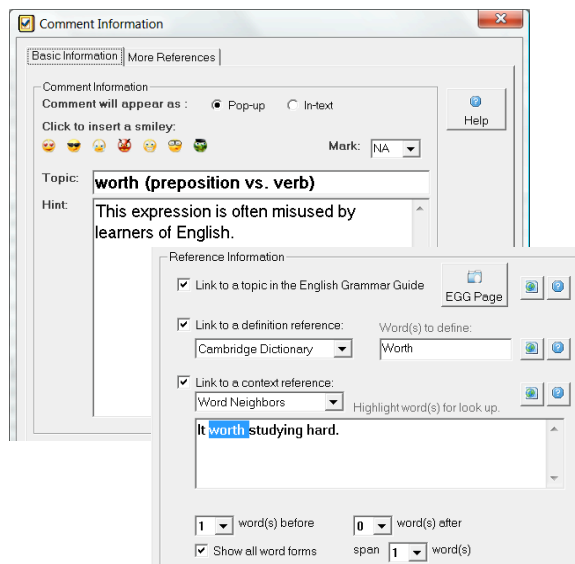
Figure 13: dialogue boxes that allow teachers to customize comments.
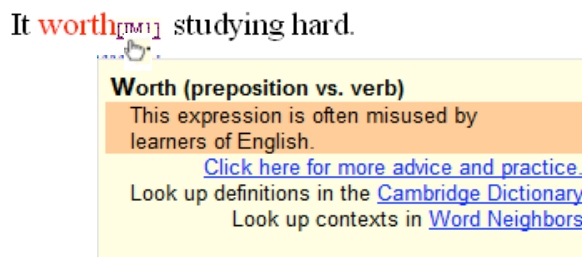
Figure 14: a comment from *Mark My Words*.

The Mark My Words program retains a database of comments made on previous assignments so that a teacher knows whether a student has had attention drawn to particular lexical and structural problems. At the bottom of each text, teachers can generate a 'Comments Table' that summarizes the comments (Figure 15). This allows teachers to maintain a record of comments given to particular students. These comments and error logs are permanently available for students and teachers to refer to as prompts for each subsequent draft and revision.

39

This procedure does not necessarily replace classroom instruction or individual consultation. However, by encouraging EFL learners to use such resources, and demonstrating their usefulness through instruction and as part of the feedback process, we can equip learners to proofread for themselves, and help them assume responsibility for becoming independent writers.

Comments Summary					
Description	Category	Instances	References	Value	Running Total
Unclear/Awkward	Comments	3	[MMW2] [MMW4] [MMW7]	-1 -1 -1	-3
Singular-Plural Form	Singular-plural	3	[MMW5] [MMW6] [MMW9]	-1 -1 -1	-6
Wrong Verb	Wrong / Unclear Word(s)	2	[MMW1] [MMW10]	-1 -1	-8
Redundant Word(s)	Redundant	2	[MMW3] [MMW8]	-1 0	-9
Punctuation	Formatting	2	[MMW12] [MMW13]	-1 -1	-11
Word Order Error	Word Order	1	[MMW11]	0	-11
Wrong or Unclear Noun/ Pronoun	Wrong / Unclear Word(s)	1	[MMW14]	-1	-12

Any scores in this table (under VALUE and RUNNING TOTAL) are for your information.
Your teacher may or may not use these scores in calculating your final grade for this assignment.

Figure 15: a summary of comments from *Mark My Words.*

6 Implementation and Assessment

The tools and techniques described above have been designed with the needs of intermediate and advanced EFL learners in mind—especially Chinese-speaking secondary and tertiary students. This approach meets many of the requirements laid out for corpus-based language learning tools (e.g., Ghadessy et al, 2001 and Romer, 2006). Other work in this area (e.g., Gaskell and Cobb, 2004) has illustrated the promise that such methods have for enabling teachers to guide students in accessing and understanding the discrepancy between their language patterns and those of Standard English.

The programs have been integrated into EFL courses at several Hong Kong universities and secondary schools and continue to undergo refinements based on user feedback. A comprehensive evaluation of students' and teachers' reactions to the programs emphasizes the need for training and pedagogical materials that support teachers and students: a number of genre-specific writing syllabuses (e.g., lab-report writing) are being built around the use of the programs.

Although our main aim is not to identify all errors or prescribe correction, the ability of the Check My Words program to identify the lexico-grammatical errors of a specific cohort of L2 writers (Chinese speakers of English) is steadily im-

proving. We maintain an 'Assignment Management System', through which students and teachers exchange electronic documents. This system enables us to collect user-generated knowledge in the form of common errors in the L2 writing of this cohort of users, as well as errors tagged by their language teachers. Students who use the Check My Words program currently submit approximately 1 million words per month, and teachers tag about 15,000 errors in these texts monthly, using the Mark My Words program. We are able to mine these texts for mal-rules and for the usage marked by their teachers, and we can use the corpus as an iterative test bed for error checking.

A quantitative analysis of about a million words of the re-drafted texts of students who have used the program, and another million words of those who did not use the program during composition show significant improvements in accuracy and fluency of those who used the program. Students who follow this process tend to use a wider range of language formulae and, as well as gaining confidence in using the tools to check lexis and structures, they more successfully attempt grammatical structures normally avoided in the novice L2 writing of speakers of Chinese (such as modality and subordination). In surveys, the L2 novice writers report that they find the programs 'very useful'. Teachers report that students who used the program as a proofreading aid were able to self-correct more reliably than students who did not use the program.

However, although the technical infrastructure of Hong Kong schools and universities can easily accommodate these programs (students and teachers generally have access to good computer facilities), the adoption of this method of feedback by teachers has been slow. Examination-driven teaching practices emphasize teacher-centered methods, and teachers have little incentive to encourage students in independent learning and discovery-based writing. Nevertheless, most teachers who try this method quickly become proficient and embrace it, recognizing that it can help transfer the burden for proofreading to their students. They appreciate being able to customize and share comments, and avoid explicit correction, while still assisting students and holding them accountable for conveying meaning in an acceptable manner and in their own words.

7 Conclusion

The programs described in this paper demonstrate techniques that can help L2 writers acquire accuracy and fluency in written English and develop life-long writing habits in the L2. The approach takes advantage of online resources to help students and teachers shift from a machine- or teacher-centered pedagogy to one that puts the L2 writer at the center of the writing process by making the learner accountable, and ultimately more confident and independent. The Check My Words and Mark My Words programs described in this paper are available from http://mywords.ust.hk/.

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